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(10)
[Reprinted from St Bartholomew's Hospital Reports, Vol. XI.]

With the Author's Undeclared.

THE
INDUCTION OF PREMATURE LABOUR.

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Read before the Abernethian Society, February 25, 1875.

The fact that women had given birth to several dead children after severe parturition, perhaps only completed by embryotomy, and that when subsequently pregnant, labour had set in prematurely, resulting in the birth of a living child, suggested the idea of anticipating labour by artificially inducing it at a period when the child, though viable, would not be too large to pass through the contracted pelvis.

It is a matter of congratulation to us that the introduction of so important a system should have emanated from our own country, and the highest tribute of praise is certainly due to those English practitioners who upheld it, and succeeded in bringing it into general practice against such violent opposition; for no one can deny that it is one of the most important improvements in the practice of midwifery. Denman tells us that 'about the year 1756 there was a consultation of the most eminent men at that time in London to consider the moral rectitude of, and advantages which might be expected from, this practice.' It received their general approval, and it was decided to adopt it in future. The first case in which it was considered necessary was undertaken, with success, by Dr Macaulay, Physician to the British Lying-in Hospital in Brownlow Street, in 1756. Very soon afterwards it was performed by Dr C. Kelly. In France, when it was first suggested, in 1779, its introduction met with the strongest opposition from M. Bandelocque and his followers. The doctors of the Sorbonne declared it a violation of the laws of the Church. Gardien, Carpuron, and Madame La Chapelle firmly resisted it.

They regarded it as immoral, barbarous, and unjustifiably endangering the life of the mother and her child. As late as 1827 it was stigmatised by the Académie Royale de Médecine as immoral. Professor Stoltz was the first in the country to practise it. He did so four years afterwards, in 1831; and in 1852, so great was the revolution of feeling, that the Académie Royale de Médecine declared the operation not only to be not 'immoral'—the term applied to it twenty-five years previously—but to be justifiable, as being less fatal to the mother, and offering a mode of delivery in contraction of the pelvis, certain hæmorrhages, and tumours which are irreducible and irremovable.

In Germany, the celebrated Carl Wenzel, of Frankfort, was the first to declare himself favourable to the operation. In Italy it met with very little opposition, and now for some time past the practice has been universally accepted.

Denman* states that Dr Savage performed it successfully on a lady of title, who had given birth to four dead children after very difficult labours; and Dr Lee† gives the details respecting a patient with deformed pelvis, in whom he induced labour no less than fourteen times. In one case only was the child born alive. The contraction was too great to admit of the operation being delayed beyond the seventh month. For some years after the recognition of the system, the only plan adopted was that of evacuating the liquor amnii by puncturing the membranes, and this method had been handed down from the ancients, by whom it was practised in the earlier months of pregnancy, in order to prevent disfigurement, as Ovid gives it,‡ or that 'the belly may be without the blemish of wrinkles.' Tertullian§ describes the instrument employed thus—'There is also a probe of bronze, by which the destroying is done in a secret, criminal manner; they call it by the Greek term *εμβρυοσφακτής*, that is to say, the murderer of the living infant.'

This, then, which hitherto had been used but for criminal purposes, was introduced as a legal practice, but only in cases of deformity of the pelvis.

During the present century, however, numerous plans have been proposed, and the reasons for the advisability of bringing on premature labour have been so multiplied, that the consideration of the subject is one that merits the attention of us all. I propose, therefore, to enter upon it at once, first considering the reasons

* Introduction to the Practice of Midwifery, 6th edit., 1824, p. 293.

† Clinical Midwifery, 2d edit., 1848, p. 81.

‡ 'Ut careat rugarum crimine venter.'—*Ovid, Amores*, 2, 14, 7.

§ 'Est etiam æneum speculum,' &c.—*Tertullian, Liber de Anima*, cap. xiii.

which have been deemed necessary for its performance; and secondly, the different methods which have been adopted.

The reasons—

1. When the bony pelvis is too narrow to allow a child at full time to pass without its life being sacrificed.

2. When dangerous affections exist in the mother, such as disease of the heart, ascites, &c., seriously aggravated by pregnancy.

3. Severe symptoms arising from the pregnant state, such as intractable vomiting, jaundice, albuminuria, chorea, mania, &c.

4. When a mother habitually gives birth to children so abnormally large that their lives are sacrificed during delivery, or when several hydrocephalic infants successively occur.

5. When repeatedly the infant has been found to die in the latter months, from disease of the placenta, or other recognised cause.

6. In cases of tumours impeding the passage, such as fibrous tumours of the uterus, exostosis, &c.

7. When sudden hæmorrhage has occurred, and there is reason to believe that the placenta wholly or partially presents.

8. In cases of dropsy of the amnion, and ovarian tumours, productive of great distress to the mother.

1. The first requires no reasoning; it is so well known that a foetal head, from the seventh to the eighth month of development, is not only of considerably less dimensions than at the full term, but that it is so much more flexible, and capable of being moulded to the passage. And yet, even a seven-months' child may grow into a fine, strong, intellectual man. Of this we have numerous examples. The generally-accepted degree of deformity, necessitating the employment of premature induction, is when the conjugate diameter measures from $2\frac{1}{2}$ to $3\frac{1}{4}$ inches. If only $2\frac{1}{2}$ inches, the operation should be undertaken at the seventh month; if $2\frac{3}{4}$ inches, at seven and a half months; if 3 inches, at the eighth month. It will be well to reckon as the seventh month 220 days from the last day of menstruation, 235 days as seven and a half months, and 250 days as the eighth month.

2. Whenever a disease known to exist in the mother is so aggravated by the pregnant state as to place her life in jeopardy, there can be no hesitation in relieving her of that which is the immediate cause of danger.

3. So with intractable vomiting, chorea, and other severe complications arising from pregnancy, it may be necessary to evacuate the uterus, in order to get rid of the cause of irritation.

4. Instances have occurred in which a succession of infants have been born so abnormally large, that it has been necessary to have repeated recourse to craniotomy. In such cases it may be justifiable

to bring on labour before the child has attained its full size. With regard to hydrocephalic infants, Sir James Simpson mentions a case in which, after a lady had given birth to two children in this state, he induced labour with a satisfactory result. A sister of this patient had also been delivered of a child in the same condition. This seems more than a coincidence.

5. There are many diseases of the placenta causing destruction to the foetus. They may be thus enumerated: Extravasation of blood; inflammation and its consequences; gangrene of portions; general oedema, or dropsy; fatty degeneration; hypertrophy; cartilaginous and calcareous degeneration. These diseases seem frequently to exert their direful influence on the child after it has become viable. I have no experience in such cases, but authors state that, whereas the foetal pulsations should be regular, and from 120 to 140 beats per minute, when placental disease has set in they become irregular, and either diminished or increased in frequency. If this be so, it is of great importance that abdominal auscultation be practised daily, whenever the previous history of a case gives grounds for suspecting the likelihood of the occurrence of placental disease.

6. In cases of pelvic tumours, incapable of being removed, which would prevent the passage of the foetus at its full term.

7. It is not uncommon for a sudden attack of hæmorrhage, about the eighth month, to furnish the first indication of placental presentation; and when this has occurred, I am convinced that the proper plan of treatment is to plug the vagina, and bring on labour. Otherwise, though the hæmorrhage may have ceased entirely after the one gush, at any subsequent period it may recur, and to such extent as to cost the patient her life. This is just what happened in a case under my own care, and I shall always regret that I did not then act according to the plan which I am now laying down.

8. Dropsy of the amnion, and ovarian tumours, may occupy so much space as to give rise to very severe pressure effects. In such cases the question of obtaining relief by ridding the uterus of its contents must be considered. If the first condition can be diagnosed, the evacuation of a portion, certainly, of the amniotic fluid, seems to be indicated, and this will probably give rise to premature labour.

With regard to ovarian tumours, it must be borne in mind that Mr Spencer Wells has tapped the ovarian cyst, and even performed ovariectomy during pregnancy, without uterine action having been set up. In his work on 'Diseases of the Ovaries,' Mr Wells* says, 'There is no proof that tapping an ovarian cyst is

* Diseases of the Ovaries, p. 183.

more dangerous during pregnancy than at any other time ; and if there be a large single cyst, tapping will afford immediate relief to distension at a very slight risk to the mother, and lead to the natural termination of pregnancy in the birth of a living child, if proper precautions be taken to prevent the escape of ovarian fluid into the peritoneal cavity, and the entrance of air into this cavity, and into the cavity of the cyst. In cases of multilocular cyst, tapping can be of little use ; the rule, therefore, should be to remove the tumour in an early period of pregnancy ; and if an ovarian cyst should burst during pregnancy at any period, removal of the cyst, and complete cleansing of the peritoneal cavity, may save the life of the mother, and pregnancy may go on to the full term.*

When, however, multilocular tumours are found associated with advanced pregnancy, the question of induction of labour must arise.

Having given the reasons for having recourse to the process of induction, I now pass on to the consideration of the various plans which have been proposed for its performance.

First, let me enumerate them in succession, and then discuss them separately—

1. Evacuation of the liquor amnii by puncturing the membranes.
2. The administration of certain drugs, particularly ergot of rye.
3. The injection of water into the vagina.
4. The injection of water within the uterus.
5. The injection of atmospheric air or carbonic acid within the uterus.
6. Galvanism.
7. Irritation of the mammæ, by means of cupping-glasses.
8. Separation of the membranes from the uterine wall, as far as is practicable, with the finger.
9. Insertion of a long gum-elastic catheter between the membranes and the wall of the uterus.
10. Dilatation of the vagina by means of air-bags.
11. Dilatation of the os uteri by air-bags.
12. Dilatation of the os uteri by means of sponge tents.

1. The old method of puncturing the membranes is still in favour with a great many. I must say that I am strongly opposed to it as a rule. I perfectly agree with what Baudelocque says when arguing against induction of labour. It is the *plan*, however, which he condemns. Probably, had that been known to him of dilatation by sponge tents, his opinion would have been very different.

He says,* ‘ If we break the membranes before the orifice of

* Baudelocque, System of Midwifery, translated by John Heath, 1790, vol. iii. p. 230.

the uterus be sufficiently open for the passage of the child, and the action of that viscus strong enough to expel it, the pains will go off in the same manner for a time, and the labour afterwards will be very long and very fatiguing; the child, deprived of the waters which protected it from the action of the uterus, being then immediately pressed by that organ, will be a victim to its action before things be favourably disposed to its exit, and the fruit of so much labour and anxiety will be lost.' What reasoning can be more sensible than this?

And yet, in the 'British Medical Journal,' during the last few months, a Medical Practitioner in Cornwall has been attempting, in a series of letters, to run down the sponge method, most ably advocated in a paper by Dr Swayne, of Clifton, and claim superiority for the plan of evacuating the liquor amnii, his whole experience of which is confined to a single case occurring in his practice, which happened to result satisfactorily, just as one hears of the waters breaking in the street, and the child being almost born before the patient could reach her house. But, I ask, is it a matter of congratulation, as a rule, when one finds that the membranes have ruptured before the os uteri has hardly commenced to dilate? Does not experience tell us that the consequence, generally, is a long, tedious labour?

2. The system of administering ergot of rye as a means of bringing on labour prematurely has two great objections. First, it is excessively uncertain in its action; my experience is, that it acts much better in increasing the uterine contractions which have already commenced, while most frequently it fails entirely to start them, even when enormous doses have been given. And it is believed that the drug, taken in large quantity, exerts a direful influence upon the foetus in utero. I think, therefore, that it should never be employed as the *sole* means of inducing labour.

3. The injection of water into the vagina. This has been employed at a temperature of from 95° to 100° F. for half an hour at a time, the douche directed against the os uteri every four or five hours. The late Dr Tyler Smith recommends hot and cold water alternately. Dr Barnes* says the vaginal douche takes one, two, or more days, and is liable to cause congestion of the lower segment of the uterus. For my own part, the inconveniences of the application, and the uncertainty of its action, would preclude my ever having recourse to it.

4. The injection of warm water within the uterus, which is known as Kiwisch's plan, was introduced by Schweighauser in 1825. Cohein, of Hamburg, in 1846, used it with creosote added. Numerous successful cases have been published; but there is one

* Lectures on Obstetric Operations, 2d edit. p. 365.

objection to it, which should prevent its ever being again attempted. It places the life of the mother in jeopardy. Lazzati has collected 36 cases in which it was employed, and of these, 12 mothers died. Surely no stronger evidence against it need be adduced. Considering that there should be almost perfect immunity to the life of the mother after other methods, no more need be said to utterly condemn the practice. But Tyler Smith, in his *Manual*,* strongly recommends it; and as this is popular among students, and very deservedly so, for the clear way in which the mechanism of labour is described, care must be taken not to accept his views upon this special subject before us. It has been demonstrated that the water may pass through the fallopian tubes into the peritoneal cavity; air may be injected into the uterine sinuses; the placenta may become detached; the uterus may be so distended as to become ruptured; or the patient may die from simple shock.

5. The same objections apply to the injection of carbonic acid or atmospheric air, though successful cases of the former have been published by Scanzoni, and of the latter by Sir James Simpson; but deaths from both have been recorded.

6. Galvanism was proposed by Herder in 1803, in order to excite uterine action; but it was not applied to the purpose which is before us till 1844, when Dr Radford, of Manchester, commenced to employ it, and did so successfully in four cases. Sir James Simpson and Dr Barnes have also, formerly, advocated it. Having so much more convenient a method at our disposal, I should never employ it, for it must be most objectionable to the patient, and tedious to the medical attendant.

7. Scanzoni proposed, and tried, the effect of a sucking-pump to the mammæ for the space of two hours. He was successful in two cases: one required seven applications, the other but three. It seems to me a very uncertain and disagreeable method, and one likely to interfere with lactation subsequently, from the irritation to the breasts caused by it.

8. Separation of the membranes from the uterine wall, as far as can be reached with the finger, is a very simple method, and one which in some cases may probably be sufficient; but certainly in the majority of instances further means would have to be adopted. There can, however, be no objection to trying it.

9. Inserting a long gum-elastic catheter between the membranes and the wall of the uterus, and leaving it there, coiling up the end in the vagina, has been found very effectual, but certain objections have been raised to it. It is said that the placenta *may* be partially separated by it, and the membranes *may* be accidentally

* *Manual of Obstetrics*, 1858, p. 552.

punctured while pressing it. These should be improbable consequences, and I believe it to be one of the best methods which we have ; for, should it fail, it may be followed up by the insertion of sponge tents.

10. In America, the term 'colpeurysis' is used to signify dilatation of the vagina, and a vulcanised gum-elastic bag called Braun's colpeurynter has been employed to dilate the vagina, with the view of setting up uterine action. While stretching the vagina, it is supposed to act also upon the os uteri, and Dr Meigs* says it is found that about four hours suffice to dilate the os uteri sufficiently to provoke good labour pains. I do not know that it has ever been carried into practice in this country.

11. Dilatation of the os uteri by elastic bags was proposed by Dr Keiller, and has been brought prominently forward of late years by Dr Barnes, who has introduced an improved form of bag for the purpose.

Speaking of the different methods for provoking the uterus into action, Dr Barnes † says, 'Now, active labour may come to pass in twelve or twenty-four hours, or in two, three, four days, or even later. There is no certainty about it. When labour comes, the child is expelled with little warning, almost suddenly, and before the medical attendant can be fetched. And it has to run the gauntlet of all those perils which especially surround premature labour unaided. It is just as feasible to make an appointment at any distance from home, to carry out at one sitting the induction of labour, as it is to cut for the stone.' Dr Barnes puts in an elastic bougie over-night, which, he says, gives rise to uterine action; next day he introduces his bags. Uterine action has been set up by the bougie, in other words, labour has commenced ; why then interfere with a process which, started artificially, may be completed gradually by the efforts of nature ? If this argument of carrying out the process of labour 'at one sitting, as one would cut for stone,' applies in premature labour, why should it not in labour at full term ? If not likely to be followed by evil consequences, it would be a great boon to the medical attendant. To be kept about by a patient whom one has found in the first stage of labour is extremely trying. How much time and annoyance would be saved if we could proceed at once to 'carry out at the one sitting' the delivery ! And I cannot see why it should apply in one case more than in the other. Barnes' bags are of the utmost value when it is desirable to complete the labour in as short a time as possible—for instance, in puerperal convulsions ; but in induction of premature labour, for causes not requiring hurry, to my mind their

* Treatise on Obstetrics, Philadelphia, 1863, 4th edit. p. 584.

† Lectures on Obstetric Operations, 2d edit. p. 363.

employment partakes too much of an operation, when there is no necessity for such discomfort to the patient.

Lastly, we have to consider the method of dilating the os uteri by means of sponge tents. It was proposed and put into practice with great success by Brüninghausen and Kluge; Velpeau strongly advocated it; and finally, Sir James Simpson, who had tried a variety of means, adopted this in preference to any other. I am convinced, with him, that it is by far the most preferable. In 1872 I wrote a paper in the '*Lancet*' in favour of it,* describing an instrument which I had designed for facilitating the introduction of the tent. Dr Bedford,† of New York, says, 'It may be found extremely difficult, in consequence either of resistance or malposition of the os, to introduce the sponge, and the abortive attempts made to accomplish the object may induce more or less irritation of the parts.' I found also this difficulty, to overcome which I had the instrument made.

Quoting from my paper in the '*Lancet*'—

'The means I advocate operate by surely and safely coaxing the uterus into an action which only differs from natural labour in being artificially initiated, and which is maintained and completed, under all the conditions of labour spontaneously occurring at a corresponding stage of pregnancy. Each of the methods in general use is, according to my experience, more or less formidable, in virtue of the amount and the kind of the manipulation which it involves. Most of them are practised in such a manner as to force on too hurriedly the uterine contractions; and that which consists in the evacuation of the liquor amnii stands self-condemned, as depriving the womb, at the very outset, of the all-important dilator provided by nature.

'My mode of procedure consists in insinuating, night and morning, between the cervix uteri and the membranes, sponge tents of gradually increasing size; the first, and each succeeding one, being as large as the parts will admit. On removing each tent, and before replacing it by another, a warm douche, containing Condyl's fluid, is administered. I have found the use of one, two, and three tents to be sufficient, and have never had occasion to employ more than four.

'The instrument by means of which the tent is placed in position is made for me by Messrs Arnold, of West Smithfield. It is shown in the accompanying illustration, and will be found fully described in the '*Lancet*' of April 22, 1871.

'It entirely obviates the use of the speculum, and being provided with what is equivalent to a universal joint, it enables the tent to

* *Lancet*, Nov. 23, 1872.

† Bedford, *Principles and Practice of Obstetrics*, 4th edit. 1868, p. 676.

be pushed, without extraneous guidance, between the cervix and the membranes, taking of itself the readiest path presented to it. For the same reason the membranes run no risk of puncture. The



tents themselves are short, rounded at the extremity, and perforated, to facilitate adaptation to the instrument.

‘The apparatus, and the mode of its application, are so simple, and so free from inconvenience and danger, that its use causes in practice little or no anxiety on the part of the patient; and until labour sets in, she moves about without pain or inconvenience, regardless of the presence of the tent.’

The plan was introduced by me at the City of London Lying-in Hospital in 1869, when I held the appointment of Surgeon-Accoucheur to that institution, and it is still carried on there by my successor, Dr Burchell.

The following table gives the record of twenty cases in which the practice described was performed, the last thirteen of them by Dr Burchell :—

Case.	Where Performed.	Date of First Tent.	Date of Delivery.	Result to Child.
1	Lying-in Hospital.	1869. Dec. 3.	Dec. 5.	Still-born.
2	„	1870. Feb. 3.	Feb. 6.	Living.
3	„	1870. March 16.	March 17.	Putrid.
4	„	1870. April 12.	April 15.	Still-born.
5	Private Practice.	1870. Aug. 6.	Aug. 8.	Living.
6	Lying-in Hospital.	1871. March 4.	March 6.	Still-born.
7	„	1871. May 8.	May 10.	Living.
8	„	1871. Aug. 9.	Aug. 11.	Still-born.
9	„	1871. Aug. 31.	Sept. 2.	Living.
10	„	1872. March 28.	April 1.	Still-born.
11	„	1872. Sept. 7.	Sept. 10.	Living.
12	„	1873. Jan. 17.	Jan. 19.	Living.
13	„	1873. March 2.	March 5.	Living.
14	„	1873. April 16.	April 19.	Still-born.
15	„	1873. June 24.	June 27.	Living.
16	„	1873. Dec. 29.	1874. Jan. 1.	Living.
17	„	1874. April 30.	May 3.	Still-born.
18	„	1874. May 27.	May 29.	Still-born.
19	„	1874. July 9.	July 11.	Still-born.
*20	„	1875. April 29.	May 1.	Living.

* This case has been added since the paper was read, to make the table more complete.

All the mothers recovered with the exception of one, that in which the child was born putrid, and she died of puerperal fever, which was then raging in the Hospital. The patient had given birth to all her former children in the same state, and that was the reason why labour was induced. From an analysis of this table, it will be seen that half of the children were born living, 1 within 24 hours of the introduction of the first tent, 10 within 48 hours, 8 within 72 hours, and 1 within 96 hours.

In the 'St Bartholomew's Hospital Reports,' vol. v., will be found an analysis by me of the midwifery cases occurring in connection with the Hospital during a space of seven years, from 1862 to 1869:—'Induction of labour was resorted to in seven cases, one in 819·14; four times with head presentation, 57·14 per cent.; once with foot presentation, once with breech, and once with placenta prævia. Four children were born living, 57·14 per cent.; and three were still-born, 42·86 per cent. All the mothers recovered.'

This again will be found a very fair average. Unfortunately no record was made of the presentations occurring in the twenty cases included in the table, but from the St Bartholomew's statistics it will be observed that three out of the seven were abnormal, and this tendency to malpresentations in premature parturition is one of the chief causes of the children not being born living.

Looking at all the statistics which have been published, it appears that rather more than half the children are saved, whatever plan be adopted. In most of the records no one system has been adhered to. The result to the mothers, however, is greatly influenced by the method employed. The danger ought not to be greater than that after ordinary premature labour, but I have already shown that, under certain systems, the mortality has been very large. Such systems, therefore, should be altogether discarded. I have met with several instances of patients who had had more than one plan carried out for procuring induction before the sponge-tent method was adopted; and I feel confident that no one would doubt the superiority of the system which I have advocated were they to hear from the patients' lips what comfort they have derived from the change of treatment, and what great anxiety has been spared them.

